

Claims

- [c1] 1. A fabrication method for a cobalt-salicide contact, comprising:
forming a dielectric layer on a silicon substrate;
forming a contact opening in the dielectric layer, wherein the opening exposes the silicon substrate;
forming a silicon nitride spacer on a sidewall of the contact opening;
forming a cobalt layer at a bottom of the contact opening;
forming an ionized metal plasma titanium layer on the cobalt layer;
forming a chemical vapor deposited titanium nitride layer on the ionized metal plasma titanium layer;
performing a first rapid thermal process to induce a reaction between the cobalt layer and the silicon substrate to form a cobalt-salicide layer;
performing a wet etching to remove an unreacted cobalt layer, the ionized metal plasma titanium layer, the chemical vapor deposited titanium nitride layer;
performing a second rapid thermal process; and
filling the contact opening with a conductive layer.
- [c2] 2. The method of claim 1, wherein the first rapid thermal process is performed at a temperature of about 500 to 600 degrees Celsius.
- [c3] 3. The method of claim 1, wherein the first rapid thermal process is performed with a nitrogen gas.
- [c4] 4. The method of claim 1, wherein the second rapid thermal process is performed at a temperature of about 600 to 700 degrees Celsius.
- [c5] 5. The method of claim 1, wherein a step coverage of the ionized metal plasma titanium layer is about 50%.
- [c6] 6. The method of claim 1, wherein the conductive layer comprises tungsten.
- [c7] 7. The method of claim 6, wherein filling the contact opening with the conductive layer is performed at a temperature of about 400 to 450 degrees Celsius.
- [c8] 8. A fabrication method for a cobalt-salicide contact, comprising:

forming a dielectric layer on a silicon substrate;
forming a contact opening in the dielectric layer, wherein an aspect ratio of the contact opening is greater than 10;
forming a silicon nitride spacer on a sidewall of the contact opening;
forming a cobalt layer at a bottom of the contact opening;
forming an ionized metal plasma titanium layer on the cobalt layer;
forming a chemical vapor deposited titanium nitride layer on the ionized metal plasma titanium layer;
performing a rapid thermal process to induce a reaction between the cobalt layer and the silicon substrate to form a cobalt-salicide layer;
filling the contact opening with a conductive layer; and
performing a chemical mechanical polishing process to removed portions of the conductive layer, the ionized metal plasma titanium layer, the chemical vapor deposited titanium nitride layer and the cobalt layer outside the contact opening.

- [c9] 9. The method of claim 8, wherein the rapid thermal process is performed with a gas including a nitrogen gas.
- [c10] 10. The method of claim 8, wherein a step-coverage for the ionized metal plasma titanium layer is about 50%.
- [c11] 11. The method of claim 8, wherein the conductive layer comprises tungsten.
- [c12] 12. The method of claim 11, wherein performing the chemical mechanical process comprises performing a tungsten chemical mechanical process.
- [c13] 13. The method of claim 11, wherein the contact opening is filled with the conducted layer at a temperature of about 400 to 450 degrees Celsius.